

CLAIMS

What is claimed is:

- 5           1.       An apparatus for determining time remaining for fluid flow at a temperature from a fluid outlet which receives fluid from a fluid source, comprising:
- a first temperature sensor for sensing fluid temperature at a fluid outlet;
- a second temperature sensor for sensing fluid temperature at a fluid source;
- a communication link; and
- 10                   a controller in communication with said first temperature sensor and said second temperature sensor via said communication link, for comparing sensed fluid temperatures to determine time remaining for fluid flow at a temperature.
2.       The apparatus of claim 1 wherein said communication link comprises a wireless
- 15   communication link.
3.       The apparatus of claim 2 wherein said wireless communication link comprises a radio frequency communication link.
- 20           4.       The apparatus of claim 1 wherein said communication link comprises a hardwire communication link.
5.       The apparatus of claim 1 wherein said first temperature sensor comprises an integrated circuit temperature sensor.
- 25           6.       The apparatus of claim 1 wherein said first temperature sensor comprises a thermocouple.

7. The apparatus of claim 1 wherein said first temperature sensor comprises a sensor system comprising:

a temperature sensor;

5 a radio frequency transmitter;

a power supply; and

a housing enclosing said temperature sensor, radio frequency transmitter, and power supply for protection from the environment.

10 8. The apparatus of claim 7 wherein said sensor system further comprises a sleeve for placement in line with fluid flow to a fluid outlet.

9. The apparatus of claim 1 wherein said second temperature sensor comprises an integrated circuit temperature sensor.

15

10. The apparatus of claim 1 wherein said second temperature sensor comprises a thermocouple.

20 11. The apparatus of claim 1 wherein said second temperature sensor comprises a sensor system comprising:

a temperature sensor;

a radio frequency transceiver;

a power supply; and

25 a housing enclosing said temperature sensor, radio frequency transceiver, and power supply for protection from the environment.

12. The apparatus of claim 1 further comprising a display device for relaying information to a user.

13. The apparatus of claim 12 wherein said display device is in communication with said first  
5 temperature sensor and said controller.

14. The apparatus of claim 13 wherein said display device comprises:  
a display;  
a radio frequency transceiver; and  
10 a power supply.

15. The apparatus of claim 12 wherein said display device comprises an audio device.

16. The apparatus of claim 1 wherein said controller comprises a device selected from the  
15 group consisting of EEPROMs, microcontrollers, and microprocessors.

17. A method of determining time remaining for fluid flow at a temperature from a fluid outlet  
which receives fluid from a fluid source, the method comprising:  
providing temperature sensors at a fluid outlet and fluid source;  
20 providing a controller;  
sensing fluid temperature at the fluid outlet and fluid source;  
communicating sensed fluid temperatures to the controller; and  
determining time remaining for fluid flow at a temperature from the fluid outlet  
with the controller based upon sensed fluid temperatures.

25

18. The method of claim 17 wherein the step of communicating sensed fluid temperatures to the controller comprises communicating sensed fluid temperatures to the controller via a communication link selected from the group consisting of wireless communication links and hardwire communication links.

5

19. The method of claim 18 wherein the step of communicating sensed fluid temperatures to the controller via a wireless communication link comprises:

sensing temperature at the fluid outlet;

converting the sensed temperature to a radio frequency signal;

10

transmitting the radio frequency signal; and

receiving the transmitted radio frequency signal at a receiver in communication

with the controller.

15

20. The method of claim 17 further comprising the step of displaying time remaining for fluid flow at a temperature from a fluid outlet on a display.

21. The method of claim 20 wherein the step of displaying time remaining for fluid flow at a temperature from a fluid outlet on a display comprises:

converting time remaining information from the controller to a radio frequency

20

signal; and

transmitting the time remaining radio frequency signal to a receiver in

communication with a display.

25

22. The method of claim 17 further comprising the step of displaying fluid outlet temperature on a display.

23. The method of claim 22 wherein the step of displaying fluid outlet temperature on a display comprises:

converting sensed fluid outlet temperature to a radio frequency signal; and  
transmitting the fluid outlet temperature signal to a receiver in communication

5 with a display.

24. The method of claim 17 further comprising the step of audibly indicating the time remaining for fluid flow at a temperature from a fluid outlet.

10 25. A method of determining time remaining for fluid flow at a temperature from a fluid outlet which receives fluid from a fluid source, the method comprising:

sensing fluid temperature at a fluid outlet;  
sensing fluid temperature at a fluid source;  
comparing at least two sensed fluid temperatures; and  
15 determining time remaining for fluid outlet flow at a temperature based upon the

comparing step.

26. The method of claim 25 wherein the step of comparing at least two sensed fluid temperatures comprises subtracting a previously sensed temperature from a later sensed temperature.

20

27. The method of claim 25 wherein the step of comparing at least two sensed fluid temperatures comprises determining a rate of temperature change from at least two sensed fluid source temperatures.

28. The method of claim 27 wherein the step of determining time remaining for fluid outlet flow at a temperature comprises:

comparing a sensed fluid outlet temperature to a sensed fluid source temperature; and

5 determining time remaining for fluid outlet flow at a temperature based upon the comparison between a sensed fluid outlet temperature and sensed fluid source temperature and the rate of temperature change.

29. A method of determining time remaining for fluid flow at a temperature from a fluid outlet which receives fluid from a fluid source, the method comprising:

providing a fluid outlet fluid temperature;

sensing fluid temperature at a fluid source;

comparing at least two fluid temperatures; and

determining time remaining for fluid outlet flow at a temperature based upon the

15 comparing step.